

# SCIENCE

FRIDAY, OCTOBER 26, 1888.

THE POLITICAL EVENTS in East Africa and the death of Major Barttelot have made the position of Emin Pacha, and probably that of Stanley, very difficult. Since the English have given up the Sudan to the Mahdi, the Europeans have lost much of their influence over the Arabs, who feel that they are able to resist European influence. As at the present time English and German traders are making rapid progress in Central Africa, and as the Sultan of Zanzibar has yielded his political power to Europeans, the Arabs are in fear of losing their profitable trade and of being compelled to abandon their slave-raids. This fear, combined with the consciousness of their power, makes the situation in eastern Africa one of great difficulty. It is erroneous to ascribe the disturbances to oppressive or offensive acts of European, especially of German officials, as the sole fact of their presence and of their progress is a satisfactory explanation. As a matter of fact, the disturbances have not originated in, and are not confined to, German territory. In April severe struggles took place between the Arabs and English traders near the northern part of Lake Nyassa. Since the German East African Company has taken possession of the coast of the mainland, the hatred of Europeans has received a sudden stimulus, and the Arabs, aided by their native supporters, everywhere offer resistance to European travellers. Thus Dr. Hans Meyer's second expedition to the Kilima Ndjaro has been scattered, and all further expeditions starting from Zanzibar have been made impossible. Besides this, new complications have arisen in the lake region. The last news from Uganda was dated June 27. According to it, communication with Emin is again absolutely interrupted. While for a long time Kabrega, King of Unyoro, seemed to be friendly to the whites, he has all of a sudden turned against them; and it would seem that the cause of his change of mind may have been either the fear of Stanley's arrival and the subsequent strengthening of Emin's power, or the advice of Arabian traders. However this may be, he has killed Mohammed Biri, the Tripolitan trader, who, in 1886, opened a trade between Uganda and Wadelai at the instance of Dr. Junker, and was the only one to continue it, and thus keep us informed of what was going on in the Equatorial Province. It would seem that Kabrega has also caused the unfortunate Captain Casati to be murdered, but it may be that this news is not correct. On account of this new interruption, the last news of Emin dates back to Nov. 2, 1887, and it seems not improbable that Stanley may meanwhile have reached him. It must be borne in mind that the news of Stanley's death and of the destruction of his caravan would have reached us from some direction. H. Wichmann, in the October number of *Petermann's Mittheilungen*, reminds us, rightly, that the news of the destruction of Hicks-Pacha in Kordofan on Nov. 5, 1883, was known in Lado in March, 1884; that the capture of Lupton Bey in the Bar-el-Gazal Province was known in November in Khartum. Events of such importance as the destruction of a whole caravan headed by many whites would have been reported and known all over the country within a few months. Undoubtedly both men, Emin as well as Stanley, are in a position of great difficulty. We are unable to know whether they have succeeded in uniting their forces since Nov. 2, 1887. The danger of their situation arises not so much from attacks of petty tribes, as from the general feeling of power and distrust against Europeans among the Arabs, and eventually in Uganda and Unyoro, and from the impossibility of obtaining the necessary ammunition and provisions. If the story of the 'White Pacha' had referred to any important event,

it is probable that we should have had additional information from the Bar-el-Gazal region.

## THE INTERNATIONAL GEOLOGICAL CONGRESS.

THE fourth session of the International Geological Congress was held in London from Sept. 17 to Sept. 22. *Nature* gives a full report of its proceedings, from which we take the following notes:—

So far as members go, the congress was a complete success, as it was more largely attended than any previous meeting, both by home and by foreign geologists. The success of such a gathering may, however, be reckoned on other lines, and here opinions on the subject may differ. Those who hold that the first duty of such a congress is to formulate rules and to fix nomenclature may well feel some disappointment; for although excellent discussions took place, and the general feeling was often evident, no formal vote on any such subject was taken. It was generally felt that votes from such mixed assemblages have no value.

Three invitations for the fifth meeting of the congress in 1891 were received from America, — from Philadelphia, New York, and Washington. Philadelphia was chosen. A committee of American geologists was appointed to take such steps as it thought necessary to make the arrangements for this meeting. The committee consists of Messrs. J. Hall, Dana, Newberry, Frazer, Gilbert, Hunt, Marsh, and Walcott.

When the congress met at Bologna, much of the time was occupied with discussions upon the exact meanings to be attached to various geological terms, and upon the general principles which should guide us in geological classification. Certain rules were then laid down, which probably few authors have consistently followed, and which it is unlikely will be universally adopted. At Berlin the discussions turned more upon precise questions of classification, especially those relating to the sedimentary rocks; upon the lines by which various groups of strata should be marked off; and, in some cases, upon the names by which these groups should be known. This change of procedure was necessitated by the progress made with the international geological map of Europe; the material for such discussion on classification having been provided in the shape of reports from various national committees, of which that from England, presented by Professor Hughes, was by far the most complete.

At the London meeting the classification of the Cambrian and Silurian strata was fully discussed; and two other questions, only lightly touched upon before, were here considered in some detail, — the nature and origin of the crystalline schists, and the upper limit of the tertiary system.

In Bologna numerous votes were taken, in Berlin several, but in London none. It was recommended that members of the country in which the congress meets should vote separately from the foreign geologists: if the votes of the two groups agree, the question will be taken as settled; if they disagree, the further consideration of the question will be postponed. The resolution further recommended that votes should not be taken on questions which are purely theoretical (such questions to be simply discussed, and various views obtained), and that decisions of the congress should only refer to the more practical questions.

Two commissions of the congress have existed since the Bologna meeting, — that on the map of Europe, and that on nomenclature and classification. The work of the former is plainly marked out, and much has yet to be done. The other commission has, however, in many respects served its purpose: it has obtained reports from the various national committees, most of which have been ably summarized by Professor Dewalque. The future work of the congress will partly lie in discussing these reports, and in deciding such questions in general classification as may apply to wide dis-

tracts, leaving minor points to be worked out by each country for itself. A commission was therefore appointed with altered and somewhat wider powers. Its functions will more fully shape themselves at the congress in Philadelphia.

The report upon the map of Europe was presented to the congress by Dr. W. Hauchecorne. This stated the progress which is being made. Four or five sheets of Central Europe will be ready for publication during the next two years; and it has been decided to publish the sheets as completed, each with its own title and index, instead of waiting for the completion of the whole of Europe, as was at first intended.

Very little time was given to the map in the public sessions of the congress; but the map commission had three long sittings, the results of which will be printed in the official report. The most important points arrived at were the adoption of the term 'pleistocene' for the index of the map (the German term '*quartär*' to be bracketed with this); the separation of the modern deposits from the pleistocene, and the mapping of the latter wherever practicable, the underlying formations (where known) to be distinguished by colored lines; in modern eruptive rocks (those of volcanoes now active or only recently extinct) the stratified volcanic tuffs are to be distinguished from the cinders and the scoriæ.

M. Karpinski has been the representative of Russia on the map commission. On this occasion he was not present, his place being taken by MM. Nikitin and Tschernicheff. The latter submitted an important note on the crystalline schists of the Ural Mountains, which would have enlivened the discussion upon this question in the public meetings of the congress. He states that the crystalline schists of the Urals contain limestones with a distinct Hercynian fauna, and also that the schists pass horizontally into Devonian strata. It is probable that in cases of this kind (and similar cases elsewhere were referred to in the public discussion) the schists will be represented by the color denoting their presumed age, while their present lithological character will be denoted by colored lines. M. Nikitin raised a point which is important in many parts of Europe, but which is especially so in Russia; that is, the necessity of distinguishing transition-beds. He instanced the Volgian beds, which link the Jurassic with the cretaceous; the Tartarian, between the Permian and the trias; and others, spoken of by M. Nikitin as Permo-carboniferous, which link the Permian to the carboniferous. These transition-beds occupy immense areas in Russia, and cannot well be fitted into the existing classification.

The discussion on the crystalline schists occupied the whole of the sitting on Wednesday, and part of that on Friday. The material for this discussion had been provided by a collection of papers printed in advance and distributed at the opening. A number of these papers were contributed by five officers of the United States Geological Survey, with an introduction by Major Powell; and by Mr. Lawson, of the Geological Survey of Canada.

In the foregoing notes we have not attempted to summarize the discussions. We have preferred to devote the space at our disposal to a general survey of the meeting, and to note some points of importance which could not well be included in a formal report of daily proceedings. The discussions may by some be held to have led to no definite result, inasmuch as no vote was taken, and therefore no formal decision of the congress can in future be appealed to. But the great value of such meetings lies in the opportunity afforded for personal discussion, and the interchange of opinions, not only in the public sessions, but in the more easy and informal conversations over the exhibits in the museum, in the corridors and reading-room, and at the friendly and social gatherings which made so pleasant a feature of the London meeting. We have no doubt that the general result of this meeting on geological opinion and progress will be at least as good as that of any which has gone before.

#### THE DEVELOPMENT OF THE CULTURE OF NORTH-WEST AMERICA.

It is well known that the Indian tribes of the north-west coast of America far excel their neighbors in their arts and industries. This phenomenon is of great interest, and well-deserving a thorough study. What was the origin of this culture? Which

among the numerous tribes of this region proved of an intellect so superior to that of all their neighbors? Is it possible to trace the unwritten history of this culture? All these questions are of interest to the historian, as well as to the ethnologist who tries to solve the psychologic laws of human development.

The north-west coast of America is inhabited by tribes belonging to a great number of linguistic stocks,—the Tlingit and Haida, the Tsimshian, the Kwakiutl, the Nutka, and the Salish. The physique of the northern tribes reminds us of the Japanese. The Kwakiutl are characterized by a comparatively long skull; the Salish, by an exceedingly short one. Our knowledge of the physique of these tribes is too imperfect to trace their genealogy. We may, however, trace their history by studying their customs and languages. It seems that the languages enumerated above represent as many different linguistic stocks, so far as our limited knowledge tends to show. Regarding the logical basis of grammar, we may distinguish three groups: the first comprising the Salish, Kwakiutl, and Nutka; the second, the Tsimshian; the third, the Tlingit and Haida. The formation of words and the grammatical inflection in the first group are effected by means of affixes and reduplication. The languages distinguish between sexes and between present and absent objects. What we call the adverb is the inflected part in their sentences. The second group is characterized by its entirely verbal character, nouns and verbs—if we may use these terms—being treated in the same way. There is no grammatic gender; but the past, present, and future tenses, as well as presence and absence, are distinguished. The plural has the same peculiarity as that found by Major Powell in several Shoshone dialects, different stems being used for singular and plural. The third group, the Tlingit and Haida, is characterized by the lack of inflected forms, juxtaposition of stems being the principle of grammatic structure and of the formation of words. These languages might almost be considered as belonging to the class of isolating languages.

These are the principal facts which we have to bear in mind in studying the culture of these tribes.

The best basis for ethnological comparisons are collections of specimens and collections of myths. The latter are the best clew to the religious ideas of a people, and reveal many remarkable customs which would escape the notice of the casual observer. A full account of the customs of these tribes is not yet available, as no scientific traveller has devoted sufficient time to their study.

The legends of these tribes are of a comparatively uniform character all over the north-west coast of America. This fact is not surprising, as the customs of all the tribes are very much alike. A careful analysis, however, shows important points of difference. It is true that the same elements occur over and over again, in varying combinations; but this phenomenon will not mislead the student, as it is one of the characteristics of myths, that in course of time they are developed by the addition of well-known elements. When we try to separate these elements from the legends, a series of myths remain which we are unable to trace to a common source.

As regards the elements common to all these traditions, their gradual distribution may be traced in studying, for instance, the legend of the 'Visit to Heaven,' which is known all over North-West America. The legend is one of the most important in the mythology of all Salish tribes, the tale being that men and animals made a chain of arrows reaching from heaven to earth, climbed it, and killed the sun. We find this same idea of the ascent to heaven incidentally used among the Tsimshian, only for the purpose of embellishing one of their legends. On the other hand, the tales of the adventures of the raven, which form the basis of the Tlingit mythology, are known on Puget Sound, where they form incidents in certain other myths.

Historical legends prove the correctness of our view that well-known elements of traditions are added to tales, and that their development is exclusively in this line. The Sitka Indians, for instance, have numerous legends referring to the administration of Baranoff. All of them have the same style that may be observed in their myths. Therefore, in studying the mythologies of these tribes, we must assume that each was in the possession of a certain stock of legends, which they carried to the coast. Whether these

originated among the respective tribes, or whether they were influenced by their former neighbors, it is impossible to decide. In course of time a common civilization of the coast tribes developed, and at the same time the exchange of legends began. Certain elements which had reference to their common mode of living must have spread most rapidly. Thus the basis of many legends is the late arrival of the salmon and other fish, and consequent starvation, or accidents to hunters and sealers. Just as frequently mention is made of persons who were believed to be possessed by evil spirits, and who were left alone to starve. Most of these elements are so widespread and of so frequent occurrence, that no theory as to their origin is possible.

Setting aside this point, the legends may be arranged in a number of groups which approximately correspond to the linguistic divisions.

The legends of the Tlingit are principally known through the researches of Vemiaminoff and Krause; those of the Haida, through Dawson. They may be considered as identical, as the existing discrepancies are not greater than variants obtained from several individuals of the same tribe. In both peoples the raven legend is the basis of their systems of mythology, and in both of them the interesting struggle between the Raven and his uncle occurs.

The legends of the Tsimshian contain several elements foreign to the first group. The study of their myths leaves the impression that they originally worshipped the heaven, and that stars, trees, and animals were the mediators between heaven and men. Sun and moon were deities or mediators of great power. Mixed with this idea we find the raven legend, and everywhere we notice the endeavors to give each, the raven and the heaven, its proper importance in the system of myths. Thus it happens that the Raven is made the grandson of Heaven. Many characteristics of the myths referring to heaven have the appearance of having been adapted only with difficulty to the myths of the neighboring tribes, and remind us of people living far to the south-east in the interior.

The myths of the Kwakiutl are very remarkable. They are one people, speaking one language with hardly any dialectic differences; and still the legends of the northern tribes are entirely different from those of the southern tribes, while those of the central ones are still of another character. The only legends that are common to all of them refer to the great religious winter dance. It is doubtful whether the legend of the Great Wanderer, who transformed men into animals, is known to all of them, or whether it is unknown to the most northern tribe, the Qaisla.

Last of all we have to consider the Salish. The great heroes of their myths are the Great Wanderer, whom I mentioned just now, and the sun, many stories referring to whom are told.

In an attempt to inquire into the origin of these legends, we must study the etymologies of mythological names. It is true that the greater number are derived from roots belonging to the language of the tribe who tells the legend. A considerable number, however, are borrowed words, and thus the origin of the legend is indicated. This is, for instance, the case in regard to the mythical figures which occur in the dances of the Kwakiutl. I found the Kwakiutl names used by the Nutka, Salish, Tsimshian, and Haida. This fact seems to indicate that these legends and customs have spread at a comparatively recent date over the coast, and it is a proof that they originated among the Kwakiutl. Another instance of this kind may be observed among the Bilqula. The ancestors of some of their clans have Kwakiutl names. Their word for shaman (*atloqala*) is a modified form of the Kwakiutl word *tho-koala*. These facts prove a long and intimate intercourse between both tribes.

It is very difficult to arrive at an understanding of the original myths of the Kwakiutl, as the northern tribes have only very few of the customs and traditions peculiar to the southern tribes. Even their social organization is not the same, matriarchate being peculiar to the northern group, patriarchate to the southern. On account of philological considerations, I think that the social organization of the Kwakiutl was originally patriarchal, or it may be more correct to say that the male and female line had equal rights. This opinion is founded on the fact that even among the tribes among whom matriarchate prevails at present, the same terms are used for denoting relationship in the male and female lines.

We have therefore to inquire how it happened that the northern tribes of this people adopted the matriarchate. Undoubtedly this is due to the influence of some of their neighbors.

A study of the mythologies of the coast shows that among the northern tribes, who have a patriarchal organization, the raven legend occurs in the same form in which we find it among the Tsimshian. It shows the same connection with the sun-myths which it has among the latter. Besides this, the division into gentes of these tribes is similar to that of the Tsimshian, who have four gentes and no phratries, while the Kwakiutl have three gentes and no phratries. The Haida and Tlingit, on the other hand, have numerous gentes, which are arranged in two phratries, — the raven and the eagle. The crests of the Tsimshian are the eagle, raven, wolf, and bear; those of the Kwakiutl, the raven, eagle, and bear. For these reasons it seems that the Tsimshian have modified the customs of the northern Kwakiutl.

There is one important consideration which leads us to the conclusion that the Kwakiutl were never immediately influenced by the Haida. It is the fact that none of their customs are found among the latter, except when carried there by the Tsimshian. Only a few Tsimshian tribes practise all the dances of the Kwakiutl, and it was only in the beginning of this century that the Haida began to borrow them from the Tsimshian. It might seem that the Tsimshian themselves imitated these dances only recently, as they have not spread over the whole people; but it must be borne in mind that the right of performing the dances is acquired only by means of marriage, and that it is watched with great jealousy. It is well known that such prerogatives are frequently preserved for long periods. Nevertheless it appears remarkable that these dances have not spread any further through intermarriage, if the reverse influence of the Tsimshian upon the Kwakiutl was sufficient to modify their social organization entirely.

I am inclined to believe that another custom of the North-West Americans besides their dances originated among the Kwakiutl. I mean the use of heraldic columns. This view may seem unjustified, considering the fact that such columns are made nowhere with greater care than in the northern regions, among the Tsimshian and Haida, and that farther north and south they are less frequent and less elaborately carved. The Haida, however, frequently took up foreign ideas with great energy, and developed them independently. We mentioned above the winter dances, which undoubtedly originated among the Kwakiutl. The use of red cedar-bark is connected with these dances. A glance at the existing collections shows that the Haida have more elaborate and varied forms of rings than any other tribe. This variety leads us to the conclusion that their dances are of similar diversity. It appears that this tribe has a remarkable faculty of adaptation.

This fact is important in considering the history of the use of heraldic columns. The division into gentes has a far greater importance in the life of the Haida than in that of any other tribe of the coast, although the mythologic foundation and the division itself are the same. The gentes and phratries of the Haida and Tlingit are identical; but while the former use hardly any heraldic columns, and do not tattoo themselves to any great extent, the columns of the Haida surpass those of the Tsimshian in size and beauty of workmanship. The faint traces of tattooing found among the Tsimshian are developed among them into an elaborate art; breast, arms, legs, feet, and back being tattooed.

A study of the legends of all these tribes shows that only the traditions of the Kwakiutl frequently allude to heraldic columns. It is true that such tales may originate in the desire to give greater importance to the possessor of such a column; and this is the more probable, as the Kwakiutl are very vain; but I think the columns are mentioned too frequently, and they are too intimately connected with important myths, to allow us to hold this idea.

I turn to considering the Coast Salish tribes. It is well known that tribes of this linguistic stock inhabit the greater part of southern British Columbia and Washington Territory: therefore the tribes of the interior must be considered in our inquiry. The mode of life of the inland divisions of this people is entirely different from that of the coast tribes. The latter live in large houses, which are similar to those of the northern coast tribes except that they are longer. They are fishermen, and use the canoe as extensively as

the Kwakiutl. The tribes of the interior, on the other hand, live in underground houses, and are hunters as well as fishermen. The hero of the Salish myths seems to be the Sun, and legends are found referring to the murder of the old sun and the origin of a new one. I am not equally sure that the legend of the Great Transformer originated among the Salish. On the coast he is undoubtedly considered the deity, but he is of far less importance among the Ntlakapamuq of Thompson River. I do not know whether the legend is known to the Salish of the interior of Washington Territory, but we know that it is known to the Chinook of Columbia River. It is also the foundation of the Nutka mythology.

Patriarchate prevails among the Salish. The division into gentes, however, is not very clear. There exist prerogatives of certain groups of families, particularly regarding the winter dances and the use of masks. The latter is undoubtedly derived from the north, as masks are few, and as it seems that they are not used by the inland tribes.

The study of the use of masks calls our attention to another interesting fact. The masks of the most northern one of these peoples, the Tlingit, have certain remarkable ornaments, representing figures of animals, which are attached to the faces. Beside this, they are not as conventional as those of the southern tribes. The masks of the Eskimo of southern Alaska have the same peculiarities, and this leads us to conclude that a mutual influence existed here. A careful study of the religious ideas of these tribes reveals another fact that strengthens the foregoing conclusion. The Tlingit as well as the Eskimo believe that there are two regions to which the souls go after death: those dying a violent death go to heaven; those dying of sickness go to a lower world, which the Eskimo believe to be under ground, while the Tlingit say that it is outside the world, on the same level with the earth's surface.

I have attempted in the preceding remarks to elucidate a few points regarding the history of North-West American culture. I have shown that it is not uniform, and that it is derived from various sources. Those facts seem to be the most convincing which prove that various tribes belonging to the same linguistic stock have not the same social organization and customs. Unfortunately the available material is not sufficient to complete our inquiry. A knowledge of the tribes of Gardner Channel and of the Salish of the interior, as well as of their southern neighbors, is indispensable in tracing the origin of the legend of the Great Wanderer.

One of the results of our inquiry is the discovery of the deep influence wrought by the Kwakiutl upon the development of their neighbors. It may be that this influence is still more important than it seems at present. The foundation of the mythology of the Kwakiutl tribes is obscure, as they themselves are much influenced by another great group of tribes, — the Tlingit and Haida.

These two tribes will form one of the most interesting objects of further researches. Their languages are very much alike in structure, while their vocabularies show great differences. Their customs and traditions are alike; but the Haida are influenced by their southern neighbors, through their frequent intercourse with the Tsimshian. The fact that the arts of the Tlingit and Haida are not of the same character is important, as it seems to prove that the arts are of foreign origin, but attained their highest stage of development here.

The legends of the Tsimshian favor the theory that they reached the coast much later than the other tribes. The Nutka, finally, are so much influenced by the Kwakiutl, that a study of their customs does not reveal any facts as to their origin.

F. BOAS.

THE increase of population of France is steadily growing less. In the past year the number of births was 899,333; of deaths, 842,797; or 23.5 and 22 per thousand respectively. The excess of births over deaths has decreased since 1881 from 108,229 to 56,536, or 48 per cent. The *Revue Scientifique*, from which we take these figures, comments in a very interesting editorial on the connection of these facts with the question of retrenching immigration into France, which is at present favored by the government and by the people, and shows that the only remedy is to open France to an unrestricted immigration from neighboring countries.

#### SCIENTIFIC NEWS IN WASHINGTON.

Photographs made on Surfaces Feebly Sensitive to Light: Making Pictures on Printing-Paper and Wood without Previous Preparation of the Surface. — A Town in Florida where they deserve to have Yellow-Fever: Dr. Posey's Report on the Sanitary Condition of Macclenny. — Do we carry an Electric Battery within us? — Floating Wrecks a Source of Great Danger to Ocean Navigation: The International Marine Conference to discuss the Subject. — The "King Devil." — How to see Insects and Plant-Roots under Ground.

#### Surfaces Feebly Sensitive to Light.

SOME interesting experiments have recently been made by Mr. J. W. Osborn of Washington, on the sensitiveness of different surfaces to light, the results of which he has described in a paper, of which the following is an abstract:—

"In thinking and speaking of substances sensitive to light," says Mr. Osborn, "photographers and others are apt to remember only the haloid salts of silver; chromic acid, under restraint, acting on organic matter; asphaltum, and a few salts of iron and platinum; which short catalogue does, in fact, include all the sensitive bodies used in practical photography." But, as every one knows, this list may be indefinitely extended (if the degree of sensitiveness be disregarded), and Mr. Osborn has prepared a number of specimens to show such extension in certain directions. Broadly, he says, the results should not be regarded as new, though in the manner of their preparation and presentation some novelty may be claimed for them.

Three specimens were prepared to show colored commercial paper which had been bleached by light, and which give, therefore, a negative when exposed under a negative. On other sheets exposed, papers colored for the purpose with eocine and methyl violet are shown, and they establish the fact that these colors, under the luminous influence, give rise to colorless compounds.

"The duration of the exposures required to produce these photographic effects," says Mr. Osborn, "is very considerable when the change is carried to its maximum; varying from twenty to thirty-five or forty hours in direct sunlight, which is the only kind of exposure employed in the experiments. Indications of photochemical action are, however, visible in much less time. A piece of eocine paper exposed under two strips of black lace showed a faint positive after half an hour; also a piece of methyl violet paper, similarly exposed, showed gradually increasing strength of the positive after one, two, and three hours.

"The fact that printing and writing papers become brown by age is familiar to most persons; but that this change is essentially photographic is not a common belief. Pieces of newspaper were taken from the *New York Tribune*, *Baltimore Sun*, and *Washington Evening Star*, and photographic images were impressed upon them by simple exposure under a dense negative. These papers were subjected to no preparatory treatment, establishing the fact that the newspapers we read daily are printed on papers sensitive to light, and adapted for the production of positive pictures.

"Pieces of white pine wood of different qualities were prepared, upon which photographs were produced by exposures under stencil negatives made by cutting openings in tinfoil and pressing it into close contact with the surface of the wood by means of a plate of glass properly clamped thereto. The exposure required to produce these photographic images varies from thirty to fifty or sixty hours. On a piece of poplar the picture was produced in twenty hours; for it seems probable, that, of all the woods in common use, poplar is the most sensitive, and gives the darkest color when fully exposed. It seems probable that the darkening of wood, which is very commonly though rather vaguely attributed to the action of the air, is related to the photographic effect obtainable on printing-papers. These are now hardly to be had without an admixture of wood-pulp; and the present inquiry, inasmuch as it proves the phenomena to be strictly photographic, may have a practical bearing if it points to means which will keep printing-papers white indefinitely."

The bleaching action of light upon a dried leaf is shown by one specimen; and by another, the fact that a piece of parchment, though substantially white, becomes a little whiter where the light has acted. As far as it goes, this would tend to show that the "yellowing of parchments by age" is not a photo-chemical process. The parchment had a very long exposure.

"As connected with this general subject," continues Mr. Osborn, "I would call to mind the investigations of Mr. Thomas Gaffield of Boston, who established conclusively, more than twenty years ago, the slow effect of light on colorless glass in gradually giving it color, sometimes pinkish and sometimes yellow, the former being apparently due to a re-oxidation of the reduced manganese employed to counteract the iron. These changes often require years for their completion.

"Experiments only just completed tend to show that pure cellulose in the form of the finest filtering-paper is not sensitive to light; at least, a constant exposure in a horizontal position to diffused and direct sunlight failed in two weeks to produce any perceptible change in color. On the other hand, the same filtering-paper colored with picric acid, and similarly exposed for the same time (about one hundred and forty hours of diffused and direct sunlight), gave a coloration as before, when sized and calendered paper of the best quality was treated with the acid.

"Simultaneously with the above exposures, another was made of the same duration and in the same way. This was the presentation of a thin stratum of commercial picric acid on glass to the same illumination as that already mentioned, under a stencil tinfoil negative and a plate of glass covering the same. The picric acid was darkened, as before, very decidedly, though it would be difficult to exhibit the results in a satisfactory way by means of a specimen."

#### Yellow-Fever and Bad Sanitation.

Surgeon-General Hamilton has just published the reports of several of the government inspectors who were detailed to visit the cities and towns of Florida, and ascertain their sanitary condition and whether yellow-fever prevailed in them or not. Among these reports is that of Dr. J. L. Posey upon his visit to Macclenny, a small town, of about six hundred inhabitants, in Baker County, in which the fever was epidemic. Here is what he says about the sanitary condition of the place:—

"The general appearance of the town, which consists of perhaps a hundred stores and dwellings scattered over a rather large area, indicated a very wretched sanitary condition. The streets along the railroad-track, as well as others, were covered with heaps of decaying sawdust, and garbage of every description spread over them, drains obstructed, and open lots overgrown with weeds and rank vegetation. The floors and platforms of the depot-buildings, passenger and telegraph offices, and their vicinity, were covered with lime, which had recently been thrown broadcast. A further stroll through the town revealed a similar deplorable sanitary state,—the steps and front galleries, and porches and premises, of residences, lavishly sprinkled with lime, and the yards filled with accumulated garbage. No organized measures had been adopted by the local health authorities to even ameliorate, much less correct, this unsanitary state of their town.

"The site of the town is a low, flat, sandy plateau, without sufficient elevation to give effective drainage; the surrounding pine-forests being interspersed with a series of marshes and alluvial basins. No attention had been given to the removal of excreta or their proper disinfection. The water-supply is generally obtained from wells at a depth of fifteen or twenty feet, and is of a quality which I consider very unwholesome, having experienced personally its disagreeable effects. The atmospheric condition resulting from such foul surroundings was fully prepared to propagate the infectious material, which had been already introduced into the town, and had been gradually developing since the 1st of August.

"I went from house to house, and found the sick and dying huddled together in small rooms, with windows and doors closed, the floors sprinkled with chloride of lime, carbolic acid, and a variety of other disinfectants. The oppressive odor of disinfectants mingling with the close atmosphere of the sick-rooms, laden with the emanations from the excreta and ejecta of the patients, together with the dreadful visages of the dying, was shocking to every sense, and the scene well calculated to appall the stoutest hearts. I have seldom witnessed a more pitiable and melancholy sight than that presented to my view in my house-to-house inspection through this desolate scourge-swept town. As I returned to the hotel in the evening, I met many whose pale, wan features, languid air, and step marked them as convalescents from the disease, and others

who, with anxious look, approached me, and in whispered tones asked to know my opinion of the prevailing fever. I told them that they must escape with the rising sun, or, remaining, fall victims to yellow-fever.

"A late report shows that there have been 189 cases out of an actual population remaining of 195, the deaths being 21 whites. Of the above number, 160 were whites and 29 colored. There are now sick 11 white and 8 colored."

Dr. Posey himself contracted the yellow-fever at Macclenny, but has since recovered.

Comment upon such a report as this is unnecessary. Yellow-fever is a disease that seeks filth and bad sanitary conditions, and, wherever it finds these and an unacclimated population, it is certain to become epidemic. Its whole history in this country proves this; and especially was this illustrated in the terrible experiences of Galveston about twenty years ago, of Shreveport a few years later, and, more recently, of Memphis. Yellow-fever never became epidemic where the sanitary conditions were good, although the germs of the disease have frequently been introduced into them. It is probable that the sanitation of Jacksonville is much better than that of the cities named was at the time the scourge swept over them; and this, it is believed, accounts for the mild form of the fever there, and the low rate of mortality.

#### The Human Heart an Electrical Battery.

The discovery announced in the following brief notice has greatly interested the scientific men of Washington, who are looking for fuller reports in the British scientific journals. This brief article appeared in the *Pall Mall Budget* of Oct. 4.

"The most important of the inaugural addresses at the hospitals was Dr. Waller's at St. Mary's, on his discovery of electrical currents caused by the pulsation of the human heart. The researches which Dr. Waller described have occupied him during the last four years; and the record was interesting, he thought, as an actual example of what goes on in physiological laboratories, and correction of 'that most unfortunate and mischievous error that they are chambers of horrors.' But more interesting still are the results of the researches themselves; for if in each human heart there be indeed an electrical battery, then developments in the art of electricity may in time become possible, beside which Mr. Edison's wonderland will seem commonplace."

#### Derelicts on the Ocean.

One of the most interesting subjects to be discussed by the International Marine Conference in Washington next spring will be "the destruction, or at least the frequent reporting, of dangerous derelicts." The fullest and most valuable information in regard to drifting wrecks, their courses and location, now furnished anywhere, is given on the monthly Pilot Chart issued by the United States Hydrographic Office. Numerous reports are received daily from the captains of vessels; and when the latest facts are plotted, and represented graphically upon the chart, captains of vessels leaving port are able to see at a glance just about where on their voyages they may expect to encounter these dangerous obstructions.

When one of these derelicts drifts into the path followed by many vessels, the danger is greatly increased, and remains until the wreck breaks up or drifts into unfrequented parts of the ocean. The Pilot Chart for October shows the very interesting history of the derelict schooner, 'W. L. White.' She was wrecked off the Delaware capes in the great March blizzard, first drifted south and then north-east, and by the last of March was found in the track of the transatlantic steamers, where she remained six months, drifting slowly north as the summer months went on, and as the steamers changed their tracks to the north. From March 13 to Sept. 19 she was reported thirty-eight times. In twenty-three instances the reporting vessel passed near enough to read her name. On May 30, three vessels 'fell in' with her; June 17, two; and Aug. 7, two. Of the thirty-eight vessels which reported passing her, twenty-eight were transatlantic steamers, and were, no doubt, travelling at high rates of speed when they passed her, and did not see her until she was close by. The awful results of a collision on any one of these occasions can better be imagined than described.

Icebergs frequently give notice of their near approach by the



falling temperature of the air, but a drifting wreck gives no such timely warning of its dangerous neighborhood. This danger is especially great in the night, in foggy or thick weather, and when the derelict is bottom-up or deeply submerged. An instance of narrow escape was the experience of the steamship 'Louisiana,' Sept. 19. While steaming at fourteen knots an hour in the Gulf of Mexico, she passed within fifty feet of a vessel two hundred feet long, bottom-up.

It is hoped that the conference will devise some plan to rid the ocean of these obstructions, or, at least, of the most dangerous of them.

#### The "King Devil."

In August, 1879, Prof. Lester F. Ward, while returning from a hunting-excursion in the North Woods, discovered near Carthage, N.Y., a new variety of *Hieracium* (house-leek), of which he obtained two specimens. The next day, after a long search, he found on a farm at Evans Mills—a small village about ten miles from Watertown—large colonies of the same plant. The individuals were many of them smaller and slenderer than, but there was no doubt that they were of the same species as, the specimens secured the day before. He secured a great number of the specimens, and remarked to his companion, that, unless the farmers of that region adopted some measures to destroy that weed, it would give them much trouble in the future.

On his return to Washington, Professor Ward identified his specimens as belonging to the species *Hieracium præaltum*, a variety of house-leek very common, and a great pest to farmers in many parts of Europe, but little known in America.

Last summer Professor Ward visited St. Lawrence County again, and one of the first things he was informed of was the appearance, six or eight years ago, and the rapid spread since, of a weed they called the "king devil." Professor Ward at once identified it as the novel variety of house-leek he had discovered during his former visit in that neighborhood, and, of course, recalled to mind the warning he then uttered. When the king devil once gets into a field, it completely covers the ground with its continuous green leaves, preventing the growth of any other plant or weed. It took such complete possession of one field of thirty acres, that there was absolutely nothing else on it—there could be nothing else.

Inquiry as to the local origin of the king devil traced it to the farm where Professor Ward had found the colony in 1879; and here, therefore, was the nest in which was hatched one of the worst pests the farmers of the United States have ever had to encounter, and from which it has spread over the country. In the region where it first appeared it has already extended over a belt of country fifteen miles wide, the length of which Professor Ward did not ascertain. It has been reported thirty miles west of Kingston, Canada, and in other places.

Various methods of eradicating the king devil have been suggested, but none of them have proved effective except the thorough salting of the land. This, of course, is expensive, and destroys all other vegetation as well as the noxious weed against which it is directed; but the field can be restored, and, while the king devil has possession of it, it is of no use whatever to its owner.

#### An Apparatus for studying Insects under Ground.

Prof. H. J. Comstock of Ithaca has, by a very simple invention, greatly extended the field of investigation for entomologists. He has made it possible for them to see insects under ground, and study their subterranean habits. The apparatus consists of a narrow frame made of wood, the two broad sides enclosed with glass. A sheet-iron shutter or screen is fitted to slide before the glass on each side, and, at ordinary times, exclude the light. Two sides and the bottom of the box thus formed are therefore narrow, and composed of wood, while the other two sides are broad pieces of glass. The top is open.

This box is filled with earth, and any plant that may be selected is set out in it. The insect living under ground that is an enemy of this plant, and whose habits it is desired to study, is also placed in the earth. The sides of the box are then closed with the screens, so as to secure the same conditions in the soil in the box as under ground in nature. From time to time, as it is desired to investigate, the screen on one side is temporarily removed, and through

the glass the movements of the insects may be observed, changes in their development noted, and important discoveries may be made.

The apparatus is made of all sizes and various shapes, so as to adapt it to any special investigation that may be undertaken. Professor Comstock has one at Ithaca so large that he keeps it in a hole in the ground, and raises and lowers it by means of a rope attached to a pole. It is admirably adapted to the study of the roots of growing plants, and may be so modified as to expose to view the underground habits of small animals that burrow.

#### COMMERCIAL GEOGRAPHY.

##### Bokhara and the Transcaspian Railroad.

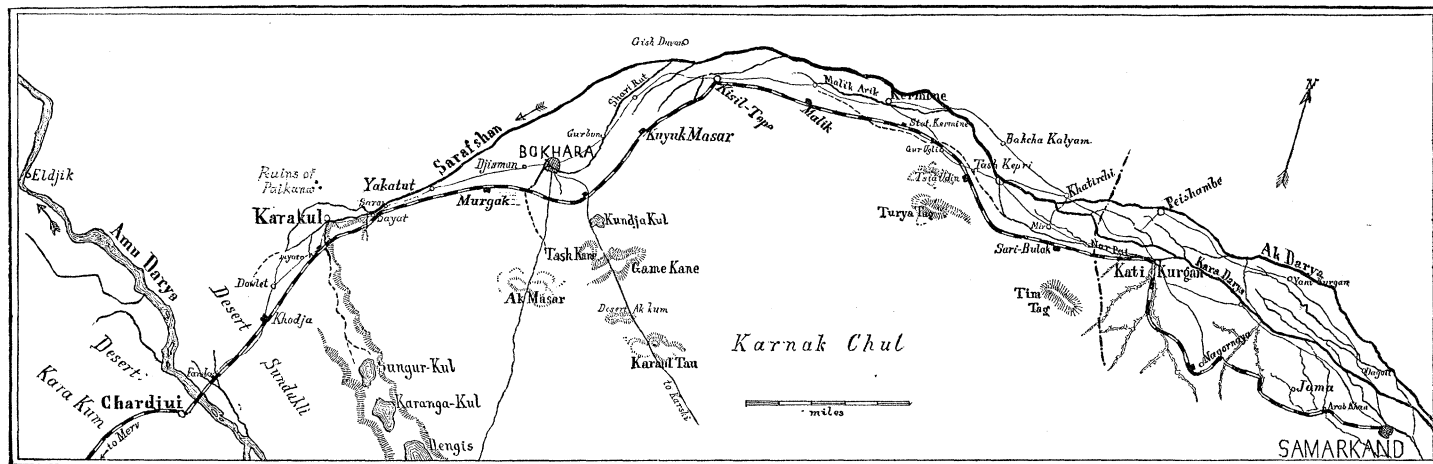
THE rapid changes brought about by the construction of the Transcaspian Railroad in Bokhara and Samarkand form the subject of an interesting paper by Dr. O. Heyfelder, which was published in the October number of *Unsere Zeit*. On Jan. 18, 1888, the great bridge across the Amu Darya at Chardjui was completed, and on May 27, Samarkand was reached. The railroad runs in a northeasterly direction from Merv to Chardjui, and, a short distance south of the latter place, enters the territory of Bokhara. Near Karakul it reaches the Sarafshan, which it ascends. Samarkand became a Russian province in 1868, but until recently it was almost isolated, large deserts being situated north-west and south-west of it. A road connects the city with Tashkent, from which place it took twenty-one days to reach St. Petersburg. The telegraph from Samarkand to St. Petersburg followed the same road. Since the opening of the railroad the state of affairs in the whole valley of the Sarafshan has greatly changed. The people of Bokhara were at first opposed to the enterprise, as it brought the country still more under Russian and Christian influence. For these reasons they insisted upon the road passing the city of Bokhara at a distance of several miles; but it seems that after the road was once opened they quickly acquiesced in the new state of affairs, and the country is now open to European, or rather Russian, influence. Lady physicians, who practise in Samarkand and Tashkent, have had a great influence upon the population, and the medical staff of the railroad is doing good work in Bokhara. Heyfelder believes that their influence will be sufficient to improve the hygienic conditions of the filthy cities of that country. European manufactures are introduced by branch offices of Russian houses, and particularly through their establishments European influence is gaining greater strength. The first of these branch offices was founded in Bokhara in 1874, after the ratification of the treaty of commerce; but the greater number were established after the completion of the railroad to Merv, and after its continuation to Samarkand had been decided. At present they are not confined to the capital, but Russian merchants are found in every city of the country. The extent of its trade will be understood from the fact that merchants from Bokhara visit annually the great fair of Nischnii-Novgorod to sell the produce of the khanate. Silk manufactures from Samarkand are sold in St. Petersburg, Moscow, and Kharkow. Sheep are purchased in Karakul, and transported by rail to the Dnieper; lamb-hides are sold to Moscow, lumber to Asia Minor; and carpets from Bokhara are valued all over the Orient. While, according to the treaty, the importation of European manufactures is favored, a wise article prohibits the sale of alcohol in the khanate. Gambling and the use of liquors have been introduced by the Russians into Samarkand, not to the advantage of the natives. It is doubtful whether the influence of the Europeans will have a wholesome effect upon the trades of the people. At present they are skilful potters, turners, embroiderers, and leather-manufacturers. It is, however, a frequent experience that trades of this kind are unable to compete with the cheap products of European machines, and that the introduction of improved methods is accompanied by a decline in native art. Samarkand and Bokhara are dependent upon the Sarafshan, cultivation being possible only by means of irrigation. There exists an admirable and complicated network of canals all along the river; but, of course, no scientific methods of irrigating are used, and consequently a great portion of the available water is wasted. Russian influence will undoubtedly tend to improve the methods applied, and thus the extent of arable land and the value of its produce will

no doubt be greatly increased within a short time. Whatever our opinion of the political institutions of Russia may be, in Central Asia they prove themselves able and energetic civilizers, and their influence upon the vast extent of country east of the Caspian Sea has been highly beneficent.

**MINING INDUSTRIES OF NEW ZEALAND.**—The report on the mining industries of New Zealand for the year 1887, which has recently been issued, shows the great importance of these industries to the colony. There are nearly 12,000 persons engaged in gold-mining, the average annual earnings of miners being \$325, and the value of the gold exported being somewhat less than \$4,000,000. About 1,500 persons were engaged in coal-mining, their average earnings being \$540. While the value of gold-production has been decreasing continually ever since 1866, when it was more than \$14,000,000, the amount of coal has steadily increased, being at present over half a million tons, of which only a small portion is exported. The total value of mineral exports other than gold has made rapid progress during the past ten years, being more than \$2,000,000 in value, as compared to \$750,000 in 1878. Of special interest is the production of kauri-gum, on which the mining department reports, although it is a vegetable product. This product is the resinous exudation of the kauri-pine (*Dammara Australis*). It is found in deposits which extend more or less over the northern portion of the Auckland Provincial District, in forests, and more extensively in

advertised as "not a rum drink," contains 13.2 per cent of alcohol. Another, admitted to contain Marsala wine, contains as much alcohol as that wine. A coca beef tonic, advertised as made "with sherry," contains 23.2 per cent of alcohol, while sherry contains but 18 or 20 per cent. Parker's tonic, claimed to be a purely vegetable extract, "stimulus to the body without intoxicating," contains 41.6 per cent of alcohol. Whiskey and brandy contain but 50 per cent of alcohol. The advertisement of this tonic says, "Inebriates struggling to reform will find its tonic and sustaining influence on the nervous system a great help to their efforts." Schenck's seaweed tonic, said to be distilled from seaweed, and to be perfectly harmless, contains 19.5 per cent of alcohol; Baker's stomach bitters, 42.6 per cent; Hoofland's German bitters, advertised to be purely vegetable, and free from alcoholic stimulant, 26.5 per cent; and Hostetter's stomach bitters, 44.3 per cent. Kaufmann's sulphur bitters contains no sulphur, and is advertised to contain no alcohol, but was found by Dr. Davenport to contain 20.5 per cent. Richardson's concentrated sherry-wine bitters contains 47.5 per cent, 2.5 less than whiskey and brandy. Walker's vinegar bitters contains 6.1 per cent; and Copp's White Mountain bitters, about the same quantity.

**CHEESE-POISONING.**—From the *Sanitary Inspector* we learn that already this season there have been reported many cases of cheese-poisoning, particularly in Ohio. The State Board of Health



LOWER COURSE OF THE SARAFSHAN.

open country. The latter is evidently the site of ancient forests, of which, except the valuable gum, not a vestige remains. The extensive use of the gum as a varnish in America and Europe has for many years led to a large export trade. The value of the export in 1887 was £362,449 (about \$1,750,000), or equal to nearly one-half the value of the gold export of the colony for the same year. The search for the gum is engaged in by both Europeans and Maoris; and at certain seasons of the year as many as ten thousand persons are engaged in connection with this industry. The gum-digger's outfit consists of a steel-tipped prod, a spade, and a bag, and, although he cannot indulge in the dreams of sudden wealth which fascinate the gold-seeker, he is sure, at least, of always averaging fair wages. Since the commencement of this industry in 1853, the quantity exported to March 31, 1888, represents a value of more than \$22,000,000.

#### HEALTH MATTERS.

**TONICS AND BITTERS.**—In a former number of *Science* we called attention to the excellent work done by Dr. B. F. Davenport, chemist to the State Board of Health of Massachusetts, in the examination of foods and drugs. Recently he has been analyzing the tonics and bitters with which the market is flooded. The number of these which have been examined by him is forty-seven. Of this number, forty-six contain alcohol, in quantity varying from 6 to 47.5 per cent, 21.5 per cent being the average. One of the tonics,

of that State was, within a short time, notified of many cases, distributed as follows: at Urbana, sixty-five cases; Mansfield, fifty; West Liberty, thirty-five; Mutual, fourteen; Marion, fifty. The symptoms were vomiting, accompanied with much pain in the stomach, and, in many cases, violent purging. The sickness usually lasted from twelve to forty-eight hours, and great prostration was a marked feature, with syncope in some cases. No deaths occurred. Tyrotoxon is suspected.

**THE TYPHOID-BACILLUS.**—Dr. C. Seitz, after a careful study of the relation of Eberth's bacillus to typhoid-fever, comes to the following conclusions: 1. Typhoid-fever is produced by the immigration of the typhoid-bacillus. The specific bacillus is found exclusively and is present without exception in typhoid-fever. Inasmuch as typhoid-fever is an exclusively human disease, the negative experiments on animals should not be brought in opposition to the influence of the bacillus as the cause of the fever. 2. The bacillus finds in the intestinal canal of man the conditions for its multiplication, and from there, without penetrating deeply into the tissues, can endanger the organism with its virulent chemical products. 3. The bacillus leaves the intestinal canal (rarely the *vie urinaire*) of the typhoid patient in a condition capable of infecting. 4. On account of its essential biological qualities, it can retain its vitality a long while in the earth (here the saprophytic, or common putrefactive bacteria, impede its multiplication). 5. In water it can live at least a week; in ice, much longer. 6. In milk it can undergo a notable multiplication. 7. The principal means by which the

typhoid-bacillus is transported, are contact with the typhoid-dejections, the use of water or milk contaminated with the bacilli, or of various substances infected through the medium of the air.

## MENTAL SCIENCE.

### Intellect in Great Britain.

THAT the study of the origin, distribution, and characteristics of eminent men both lends a peculiar charm to history and at the same time furnishes the key to many of the influences that shape civilization, is a thought that has inspired many a student. The temperaments and training of different writers have led them to attack the problem from various points of view. In our own day much interest has been exhibited in the study of great men from what might be called the 'natural history' point of view, — a view that emphasizes the importance of average results in contradistinction to a minute study of the individual as individual; that inquires into the influences of ancestry, of environment, physical, mental, and moral. M. de Candolle's study of scientists, and Mr. Francis Galton's work upon 'Hereditary Genius,' are eminent instances of work in this field. It is as a minor contribution to this study that Dr. A. Conan Doyle (*The Nineteenth Century*, August, 1888) analyzes the geographical distribution of eminent men in the Great Britain of to-day. Such an analysis may suggest the influences of climate, as well as of educational, political, and other artificial surroundings.

The first question is, naturally, who are the eminent men? Dr. Doyle does well in requiring as a test of eminence the appearance of the name in a standard biographical dictionary, such as the 'Men of the Time,' excluding as far as possible all merely local celebrities. He thus finds about 1,150 men, "who have, during the latter part of the Victorian era, attained eminence in literature, poetry, art, music, medicine, sculpture, engineering, law, and other intellectual walks of life." Of these, 824 were born in England, 157 in Scotland, 121 in Ireland, and 49 were born abroad (it should be added that an appreciable number of men are of immediate Irish or Scottish extraction, though born in England). Comparing these numbers with the populations of the three countries (including Wales under England), we find that Scotland ranks first, with 1 man of distinction to 22,000 of the population; England next, with 1 to 31,000; and Ireland last, with 1 to 49,000. If we take Wales separately, England's proportion becomes 1 in 30,000, and Wales foots the list with but 1 in 58,000.

The showing of London, as the great intellectual centre, is a chief point of interest. Of the 824 Englishmen, 235 are of London birth, which, placing the population of London as one-seventh of that of England, gives London 1 celebrity to 16,000, and the provinces not more than 1 in 34,000. This shows at once how strongly the brightest intellects are attracted to the metropolis. But Dr. Doyle points out, that while London stands so well as regards celebrities, if we confine our attention to men of first-rank ability, the provinces show a superiority. While not re-enforcing this statement with percentages, he asks us to remember that Darwin, Owen, Hooker, and Tyndall; that Leighton and Millais; that Herbert Spencer; that Tennyson, Carlyle, Freeman, Lecky; that Dickens and 'George Eliot,' — are all country-born.

Continuing this analysis, it is found that London is especially strong in the production of artists and scientists, — both branches in which organized educational institutions are of supreme value. The following table may serve for a partial comparison of London with the counties to the north and south: —

	Total Celebrities.	Authors.	Scientists.	Artists.	Poets.	Musicians.
London. ....	235	66	34	37	13	10
North of London.....	227	64	30	14	9	8
South of London.....	200	66	18	13	9	4

The remaining Londoners include 20 theologians, 12 medical

men, 8 lawyers, 5 sculptors, 4 soldiers, 4 seamen, and 22 who must be classed as miscellaneous.

The detailed analysis of the standing of the several counties is hardly of interest to an American public. In the southern counties there appears 1 celebrity to 23,000 of population. The county of Hampshire stands best, with a ratio of 1 in 13,000. The midland counties are unmistakably and regularly less fertile intellectually than the southern counties, producing only about half the proportion of celebrities, or 1 in 41,000. Physical surroundings furnish no clew to this difference; and Dr. Doyle regards it as racial, as due to a purer and better-developed stock. The four eastern counties of Lincolnshire, Norfolk, Suffolk, and Essex stand even higher than the southern, with a ratio of 1 in 22,000. It is interesting to note that Suffolk is the county of famous women, producing Agnes Strickland, Jean Ingelow, Miss Edwards, and others. In the northern counties the statistics do not bear out their reputation for sagacity, making only 1 in 43,000 celebrated.

"All English results for the larger divisions of the country are put in the shade by the lowlands of Scotland, where 1,800,000 people yield 97 celebrities, or 1 in 18,500. These figures put that portion of Scotland which lies between the Forth and Clyde on the north, and the English border, in the proud position of having reared a larger number of famous men in the later Victorian era than any other stretch of country of equal size." "The single town of Edinburgh has produced no less than 46 worthies, which, when compared with the population, gives an average of 1 in 5,500, nearly three times as high as that of London." The north of Scotland furnishes 31 names, in which the Aberdeenshire district ranks best.

The following table for Ireland shows that Dublin can well hold its own with any English city in its contribution to English worthies: —

	Population.	Celebrities.	Ratio.
Town of Dublin.....	400,000	45	1 in 8,500
Rest of Leinster.....	900,000	12	1 in 75,000
Munster.....	1,390,000	29	1 in 47,000
Connaught.....	846,000	7	1 in 120,000
Ulster.....	1,800,000	27	1 in 66,000

In reviewing these results, Dr. Doyle notices, that, if a line be drawn through the centre of Lincolnshire, the poetry of the nation will be found on the south of it. The list includes Tennyson, Swinburne, Browning, William Morris, Matthew Arnold, Sir Edwin Arnold, Gosse, and a host of lesser lights; while the few above this line are readily counted. "It may be generally stated, that, with a few notable exceptions, music, poetry, and art reach their highest development in the south, while theology, science, and engineering predominate in higher altitudes." Again: the towns have a greater intellectual activity than the country, and the agricultural districts are usually richer in great men than manufacturing or mining districts.

**SPEECH AND MUSIC IN DISEASE.** — In those strange mental disorders in which one of the factors of speech is lost, it is a general law that the most recently organized function, the one representing the higher stages of civilization and education, is the one first to be affected. A German alienist (*Neurologisches Centralblatt*, Sept. 15) has recently described cases admirably illustrating the truth of this generalization. Expression by gesture, without the use of symbolic words, is a more primitive form of expression than is regulated speech. Similarly the expression of emotional states by mere sound, by music, is an earlier acquisition than speech. In 16 cases of aphasia, 11 showed marked inability to express their thoughts by the ordinary vocal articulation. The defect was not a loss of intelligence or a paralysis, but the association between the ideas and the feeling of the vocal mechanism when uttering the sounds expressing such ideas is lost. In these eleven cases the power of singing and understanding melodies was retained. These patients, too, retained the gesture-language and full powers of emotional expression. They could automatically repeat what was spoken to them just as well when this made sense as when it did not. In the other five



cases, however, the loss of speech brought with it the loss of musical expression, though it was definitely ascertained that at least two of the five were musically inclined. Whether these differences depend on individual education, upon different locations of the affected mental centres, or upon the intensity of the affection, remains to be determined.

#### ELECTRICAL SCIENCE.

##### Electric Conductors for Alternating Currents.

ONE of the most practical and useful papers read before the last meeting of the British Association was one by Sir William Thomson, in which he calculated the distribution of a rapidly varying electric current in a conductor.

It is well known that an electric current which has reached a steady condition in a wire is uniformly distributed through its section, and the resistance of the wire varies inversely as the area. But with rapidly varying currents the case is different, and the difference may be understood from an analogy to liquid motion, due to Mr. Heaviside. In the first place, Professor Poynting has shown that the electrical energy which appears in a wire carrying a current is not conveyed directly through the wire from the dynamo or battery supplying it, but it is first conveyed to the medium surrounding the circuit, and then enters the wire at every point from the medium. According to Mr. Heaviside, the state of the case may be partially represented by a hollow tube in a tank of water. If we move the tube slowly in one direction, and if the tube be long in proportion to its diameter, then in a short time all of the particles of water in the tube will be moving with it, at the same velocity. This represents a steady current; and it partly illustrates Professor Poynting's idea, for the motion of the water is due to the friction of the tube at every point of the boundary, not to a pressure along the tube such as would be produced by a piston in it.

If, instead of giving a steady motion in one direction, we move the tube backward and forward rapidly, we will have the outer layer of water moving nearly as fast as the tube, the velocity decreasing as we proceed inward; and, finally, if we make the oscillations short enough and rapid enough, the inner layers will not move at all, only the particles near the outside taking part in the motion.

Now, this is exactly what happens in the case of an electric current which changes very rapidly. If the change is rapid enough, the current—corresponding to the velocity of the particles of water—will be mainly near the outer surface of the wire, and it might happen that there is no current at all at the axis. The effect of this is to increase the apparent resistance of the conductor, causing a greater loss from heating, and a greater fall of potential, than ordinary calculation would give.

Now, although these facts have been pretty well known since Maxwell's treatise on electricity and magnetism was published, yet very few people suspected that they would have any practical bearing on alternating systems of electrical distribution. Sir William Thomson, however, in calculating out some numerical examples, obtains results which show that in the alternating system as ordinarily used a considerable portion of the inside of the conductors does not carry any current at all, and is useless. For example: with the period of alternation used by the Westinghouse Company in the United States, in the neighborhood of eight thousand a minute, the current does not penetrate so much as one-eighth of an inch into the wire. The size of conductor used for distributing current for even a moderate number of lamps—say, a thousand lamps at a mean distance of a mile—is much beyond this limit of semi-diameter, in the case cited being more than half an inch in diameter. The result is a much greater loss by heating than is usually calculated, and a fall of potential that in some cases interferes with the brightness of the lamps. In order to make these effects a minimum, it would be necessary to use for conductors either thin, hollow tubes, or thin, flat strips of metal, and especially is this the case when a large number of lamps are to be supplied. The expense of the tubes would in all probability make their use impracticable; so that in future we may expect to see any extended alternating-current distribution either with copper strips as conductors, or with a number of comparatively small wires. It should be pointed out as an illustration of the value of a sound mathematical

training in applied electricity, that the best form of conductor for any particular case of distribution, whether strips, a single wire, or a number of wires, can be calculated from obtainable data as to prices. It is the experience of the writer, however, that few electric plants are installed in a way to secure the greatest economy, and much money is wasted needlessly from neglecting to make the necessary calculations.

**THE SUN-LAMP.**—One of the most attractive of high-power electric lamps is that known in France, where it was invented, as the '*lampe soleil*.' It consists of a wedge of some refractory material, marble preferably, held between two carbon rods that are inclined to one another. This is set in a cavity in a marble block held in an iron frame. A very simple lamp of this kind can be made by boring a couple of holes in a block of marble so they are slightly inclined and approach within about a quarter of an inch at the bottom, and putting in two carbon rods. If this be supplied with an alternating current to form an arc between the carbons, the marble will be heated, and will give off a brilliant, mellow light of a golden tinge, very different from the piercing but rather disagreeable light of the ordinary arc-lamp. A very high candle-power can be obtained from it, and it is absolutely steady. The objections to its use arose from the facts that it was not certain to start up automatically when the current was turned on, and it required alternating currents instead of direct. This was some years ago, before alternating currents had been largely introduced. From the fact that a larger surface has to be heated than in the ordinary arc-lamp, and the surrounding material conducts away a considerable amount of heat, the lamp is not so economical as are arc-lamps. In the last few years alternating-current distribution has been developed, and now an English syndicate is being formed to introduce a modified sun-lamp, in which many of the objections of the old form have been removed. The lighting is now automatic and certain, and the lamp can be used either with continuous or alternating current generators. For lighting halls, galleries, etc., and in general for interior illumination, this modified lamp should have an extensive field.

**THE ELECTRIC LIGHT VS. GAS IN FRANCE.**—Messrs. Brun & Co., owners of a silk-manufactory at St. Clamond, give some particulars, in *Annales Télégraphiques*, as to the comparative cost of gas and electric lights, obtained from two years' experience in their works. The original lighting of the factory was by 540 gas-jets, consuming 20,000 francs' worth of gas annually. These were replaced by 600 incandescent lamps,—one-half Edison, the rest Swan,—the average life being 1,200 hours. The current is supplied by an Edison dynamo of 450 ampères and 100 volts. It has worked for 18 months at an average of 15 hours per day. Part of the factory works night and day, and some of the lamps work 3,600 hours a year, while others are only used for 600 hours. The following are the expenses:—

Cost of 90-horse-power engine, with fittings.....	32,000 francs.
Dynamo, conductors, lamps, etc.....	23,000 "
Total.....	55,000 francs.

The yearly cost is, —

10 per cent sinking fund.....	5,500 francs.
5 " " interest.....	2,750 "
Increase in coal-consumption.....	1,200 "
" " oil, etc.....	250 "
Renewal, 600 lamps.....	2,700 "
Total.....	12,400 francs.

The saving is 7,600 francs per annum. The item of labor is not included, as the force of mechanics was not increased on putting in the installation.

#### BOOK-REVIEWS.

*The Land beyond the Forest.* By E. GERARD. New York, Harper. 12°.

MRS. GERARD has collected her observations during a two-years' life in Transylvania in the present attractive volume, and greatly enhanced the value of her descriptions by adding to her own experiences information from other sources, which became

full of life in her mind, that is so deeply impressed by the wild beauty of this remote province, and by the strange admixture of races by which it is peopled. The authoress describes the Saxons, Roumanians, and gypsies very fully, while she gives only a passing glance to the Hungarians. It is probably because she became more intimately acquainted with the former, and studied their customs and beliefs more thoroughly, that she confines herself to the description of this part of Transylvanian life. The large amount of interesting and valuable ethnological information collected by the authoress deserves our full admiration. Customs and beliefs which have survived from the ancient days of paganism or from the superstitions of the middle ages offer a peculiar interest to the student of the history of civilization; and the present volume contains much that is worth a thorough study, and that will interest the thoughtful reader. The descriptions of the country and of its inhabitants are vivid, and made more impressive by numerous illustrations, which are the more welcome, as Transylvanian scenery is little known, and has not yet received much attention by artists.

*Manual of Chemistry.* By W. SIMON. 2d ed. Philadelphia, Lea Bros. & Co. 8°.

THIS manual is designed to be a guide to lectures and laboratory work for beginners in chemistry, and a text-book specially adapted for students of pharmacy and medicine. The contents are divided into seven parts. The first part treats of the fundamental properties of matter, extension or figure, divisibility, gravitation, and porosity. In the second are considered the fundamental principles of chemistry, including chemical divisibility, the laws of chemical combination, the determination of atomic weights, the decomposition of compounds, and some general remarks regarding elements. Non-metals and metals, with their combinations, are next discussed. Then follow analytical chemistry and the consideration of carbon compounds or organic chemistry, while the last part is devoted to physiological chemistry. As a help in laboratory-work, experiments are described which may be readily performed by students with a small amount of apparatus. Professor Simon, in common with other teachers, has often noticed how difficult it is for beginners to familiarize themselves with the variously shaded colors of chemicals and their re-actions; and, in order to remove this difficulty as far as possible, he has introduced into the manual seven plates, which contain fifty-six representations of the most important color-changes. The coloring is remarkably correct, and will undoubtedly do much to overcome the difficulty which these plates were designed to meet. The book is in other respects fairly well illustrated. The typography and general make-up of the book are excellent, and we have no doubt that it will meet the same favor which was accorded to the first edition.

#### PUBLISHERS' FALL ANNOUNCEMENTS.

##### Estes & Lauriat.

For young people: 'Zigzag Journeys in the Antipodes,' a volume which takes the reader to Siam, and tells him of the interesting animal-worship of the country; 'The Knockabout Club in the Antilles,' by F. A. Ober; and 'Hunting in the Jungle,' from 'Les Animaux Sauvages,' by Warren F. Kellogg. 'The Pioneers of the Alps: A Collection of Portraits of the Leading Guides of the Oberland, of the Valais, of Savoy, and of Piedmont,' by C. D. Cunningham and Captain Abney. 'Fingers and Fortune: A Guide-Book to Palmistry,' by Eveline M. Farwell. 'The Pocket Encyclopædia,' containing 1,206 columns, upwards of 25,000 references, and numerous plates (published by subscription only). Editions de Luxe of standard and fine art works now issuing or soon to be issued (to subscribers only): 'History of Greece and of the Greek People, from the Earliest Times to the Roman Conquest,' by Victor Duruy; and 'Birds in Nature,' by R. Bowdler Sharpe.

##### Thomas Nelson & Sons.

'David Livingstone, the Story of his Life and Travels,' with many illustrations; 'The Emperor of Germany,' William I.: A Life Sketch,' by Athol Mayhew, with 8 full-page illustrations by R. Caton Woodville; 'Little Arthur at the Zoo, and What he saw there — Birds,' by Mary Seymour; 'The Story of the Niger: A

Record of Travel and Adventure from the Days of Mungo Park to the Present Time,' by Robert Richardson; 'India, Pictorial and Descriptive,' by the author of 'The Mediterranean,' illustrated with 112 fine engravings; 'The Nineteenth Century: A History,' by R. Mackenzie (new edition, revised and enlarged); in the Pen and Pencil Series, 'Irish Pictures, drawn with Pen and Pencil,' by Rev. Samuel Manning, LL.D., Rev. S. G. Green, D.D., and others; 'Great Authors, from Goldsmith to Wordsworth,' with biographies and copious selections from their writings; 'Great Authors, from Macaulay to Browning,' with biographies and copious selections from their writings.

##### Frederick A. Stokes & Brother.

'The Golden Age of Patents,' by Wallace Peck, a most amusing parody on Yankee inventiveness, filled with clever skits, well illustrated by various humorous artists; 'Oysters and Fish,' by Thomas J. Murrey, a most complete and important work on the subject, deemed by the author himself as one of his most valuable books, and containing over 150 recipes and much interesting information regarding shell-fish and fish of many kinds; 'Eight Songs of Horace,' edited by George E. Vincent, a remarkable novelty, which has received the most careful attention in every detail, being an attempt to reproduce with all possible exactness a Roman book of the classic period; 'Favorite Birds, and What the Poets sing of Them,' edited by Josephine Pollard; 'The Game of Chess,' an entirely new edition, based upon Staunton's great work, and containing all essential parts of it; in the Lives of the Presidents Series, 'Grover Cleveland,' by William O. Stoddard; 'Madonnas by Old Masters,' being as exact facsimiles of the originals as it is possible to make by any process resulting in a copper or steel plate (the publishers know of nothing of their general nature which copy the same paintings and can compare with these valuable plates).

##### Miscellaneous.

The ninth volume of 'Alden's Manifold Cyclopædia' (New York, J. B. Alden) is out. — 'Pen and Ink: Papers on Subjects of More or Less Importance,' by Brander Matthews, will be issued shortly by Longmans, Green, & Co. It contains essays on Locker and Austin Dobson, on war songs and short stories, on the antiquity of jests, and on the ethics of plagiarism, and also the first serious paper yet written on the genesis and practice of the American game of poker. 'B.C. 1887' is the odd title of a volume of travels in British Columbia, by the authors of 'Three in Norway,' Messrs. Lees and Clutterbuck, to be issued this month by the same publishers. Although humorous in manner and full of anecdote, 'B.C. 1887' is an account of a serious expedition of two young Englishmen who came to America with a view to settling in the Dominion. — D. Appleton & Co. will publish on or about Nov. 1 a new volume by Sir John Lubbock, entitled 'On the Senses, Instincts, and Intelligence of Animals, with Special Reference to Insects.' It will form Vol. LXIV. of the International Scientific Series. The same firm announces 'A Manual of Decorative Composition,' for designers, decorators, architects, and industrial artists, by Henri Mayeux, architect to the French Government, with nearly 300 illustrations; 'A Dictionary of Terms in Art,' elaborately illustrated; 'Nature and Man, — Essays Scientific and Philosophical,' by the late Dr. W. B. Carpenter, with an introductory memoir by J. E. Carpenter; and 'The Folk-Lore of Plants,' by T. F. Thiselton Dyer. — Charles Scribner's Sons published last week 'Children's Stories of the Great Scientists,' brief biographies of sixteen of the world's great scientists, by Miss H. C. Wright, with 8 full-page portraits. — Harper & Brothers have ready 'The Boy Travellers in Australasia,' by Col. Thomas W. Knox, a description of the isles of the Pacific; and 'Shoshone and other Western Wonders,' an account of sights and scenery worth seeing in the Far West, by Edwards Roberts, with an introduction by Charles Francis Adams. Messrs. Harper and Brothers announce that John Morley's English Men of Letters Series, which hitherto has been issued in thirty-six volumes, has now been compressed into a People's Edition of twelve volumes. — Mayor Hewitt's more or less cheerful face adorns the first page of *Harper's Weekly* for Oct. 17. The supplement is devoted to a description, pictorial and otherwise, of 'The United States Coast and Geodetic Survey,' by Henry P. Wells. — Houghton, Mifflin, & Co.

announce Mr. Hurlbert's book, 'Ireland under Cœgrcion,' which has created so much discussion in Great Britain. — Thomas Whitaker is about to publish a library edition of Pascal's 'Thoughts,' from the text of Molinier, by C. Kegan Paul. He also begins a new series of illustrated books under the title of 'Whittaker's Home Library.' The first three volumes will be 'Romance of Animal Life,' by J. G. Wood; 'Leaders Upward and Onward,' by H. C. Ewart; and 'Round the Globe,' by W. C. Proctor. — Robert Clarke & Co. have in press a book by Joseph S. Tunison, of the New York *Tribune's* editorial staff, to be entitled 'Master Vergil: a Series of Studies upon the Mediæval Reputation of the Author of the *Æneid*.' 'Vergil and the Devil,' 'Vergil in Literary Tradition,' 'Vergil's Book of Magic,' 'Vergil the Man of Science,' 'Vergil the Saviour of Rome,' 'Vergil the Lover,' 'Vergil the Prophet,' and 'Vergil in Later Literature,' are the chapter headings, and give a fair idea of the contents and character of the book. — Henry Willey, New Bedford, Mass., has just published 'A Synopsis of the North American Lichens, Part II.,' by the late Edward Tuckerman, comprising the *Lecideaceæ* and (in part) the *Graphidaceæ*. The work, which was left unfinished at the time of the author's death, has been completed by Mr. Willey, who has also added other lichens from Professor Tuckerman's various works. Students of this interesting and difficult branch of botanical science have now for the first time a handy manual by two of its foremost exponents. Edwin Nelson, Amherst, Mass., will supply the book to the trade. — D. C. Heath & Co. have begun the publication of a series of leaflets for the guidance of students of English literature of the nineteenth century, prepared by Louise Manning Hodgkins, professor of English literature at Wellesley College. The following English and American authors will be included: Scott, Lamb, Wordsworth, Coleridge, Byron, Shelley, Keats, Macaulay, Dickens, Thackeray, Robert Browning, Mrs. Browning, Carlyle, George Eliot, Tennyson, Rossetti, Irving, Bryant, Hawthorne, Longfellow, Emerson, Whittier, Holmes, and Lowell. The Tennyson, George Eliot, Hawthorne, and Longfellow papers are now ready. — Cassell & Co. announce a work entitled 'The Truth about Russia,' by W. T. Stead, editor of the *Pall Mall Gazette*, who does not, it is said, share the traditional British attitude of suspicion toward the empire of the north. — Ginn & Co. will publish in December, in the College Series of Latin Authors (edited under the supervision of Clement L. Smith and Tracy Peck), 'Cicero's Brutus,' edited by Martin Kellogg, professor of Latin in the University of California. In the 'Brutus,' which was composed in 46 B.C., and purports to be a conversation with Atticus and Brutus, Cicero traces the development of oratory among the Romans down to his own time, with critical notices of about two hundred speakers. The long catalogue is relieved of dryness by the dialogue form, the freedom of digression, and by Cicero's fresh and teeming style. Professor Kellogg has edited the work especially for early college-reading. — J. B. Lippincott Company announce as in press 'The Writer's Hand-Book,' a general guide to the art of composition and style; 'An Elementary Treatise on Human Anatomy' (entirely new edition), by Joseph Leidy; 'A Cyclopædia of Diseases of Children and their Treatment, Medical and Surgical,' edited by J. M. Keating, M.D.; 'Paradoxes of a Philistine,' by William S. Walsh; 'History of the Celebration of the One Hundredth Anniversary of the Promulgation of the Constitution of the United States,' edited by Hampton L. Carson; 'The Clinical Diagnosis of Non-Surgical Diseases by Bacteriological, Chemical, and Microscopical Methods of Research,' by Dr. Rudolf von Jaksch, translated into English by Dr. Cagney. — 'The Private Correspondence of Daniel O'Connell,' to be published in two volumes in October by Longmans, Green, & Co., consists chiefly of hitherto unpublished letters of the liberator, abundantly annotated, and connected by only sufficient narrative to explain their occasion. Although called private, O'Connell's letters, even those to his wife, are chiefly on public topics. There is a peculiar timeliness in the publication just now of this first-hand and personal account of the successful struggle for Catholic emancipation, and of the later ineffectual effort for the Repeal of the Union. — In *Lippincott's* for November an article of particular interest is Mr. Edgar Saltus's 'Morality in Fiction.' Another article that will be eagerly perused is the 'Extracts from the Diary of John R.

Thompson,' compiled by Elizabeth Stoddard. Thompson, a well-known Southern *littérateur*, was sent to London to edit the *Index* on behalf of the Confederacy, and he was thrown with men like Tennyson, Carlyle, Gladstone, Dickens, Thackeray, and many others, of whom he gives entertaining reminiscences and anecdotes. Lincoln L. Eyre's article on 'Corporate Suretyship' is interesting and valuable.

#### NOTES AND NEWS.

THE topographic work of the arid lands and irrigation survey has been completed at the United States Geological Survey in Washington, and all the parties to be employed this year are already in the field. The hydrographic branch involves some very difficult scientific problems, the solution of which may cause some delay. Among these are the discovery of a method that shall be more accurate than any now employed to measure the volume of water that passes through a river. This is probably among the simplest of the problems. Another is a means of ascertaining the amount of sediment a river carries, and a third is the invention of some method of determining the annual amount of evaporation from the surfaces of the proposed reservoirs.

— General Greely, in his annual report, says that the percentages of successful weather-predictions made by the signal office for the year were 78.4; wind, 75.5; temperature, 74.2; general average, 76.7. The number of cold-wave signals displayed was 1,743, of which 1,240, or 71.5 per cent, were verified.

— Dr. Theodore Gill, at the meeting of the Washington Biological Society last Saturday evening, read a paper on 'The Families of Fishes.' He said that in 1872, after eleven years' study of the subject, he published a list of the families of fishes numbering 244. Subsequent studies have increased this number to 300. Cuvier recognized only 30. At the same meeting Dr. Gill defended his use of the suffix 'idæ' to the Greek or Latin root to designate a family instead of 'atidæ,' the one used by naturalists for a century. He read letters from the most distinguished Greek and Latin scholars in the country, asserting that 'idæ' was grammatically the only proper form. The members of the society who discussed the subject were not convinced by Dr. Gill's arguments and authorities.

— 'Sexual Characteristics of the Lachnosternis' was the title of a paper read by Mr. J. B. Smith of the Department of Agriculture, before the Washington Biological Society at its meeting last Saturday evening. It described a study by the author, last summer, of the June-bug, about which, strange to say, entomologists before knew comparatively little. The study resulted in the identification, among the many thousands of specimens captured in the District of Columbia, of four strongly marked, well-defined species, the female as well as the male of each species being determined.

— In a pamphlet, 'Great-Circle Sailing,' published by Longmans, Green, & Co., Richard A. Proctor advocates the use of the stereographic polar projection for laying out the shortest sea-routes. As is well known, the gnomonic projection is used for finding the great circle between two points that are not too far distant from each other. As this projection, however, does not allow the representation of more than about one-third of the earth's surface, it is not suitable for finding the great circle between points that are far apart. Proctor uses the property of the stereographic projection, that each circle on the sphere is projected into a circle, which may be constructed on the map with great ease. Thus, by laying a circle through two points and one of their antipodes, the shortest route between the two points is found. A similar construction permits the finding of the shortest route which does not cross a certain degree of latitude beyond which navigation would be dangerous. Two maps of the earth are constructed, — one in south polar projection, the other in north polar projection, — and each is adapted to construct routes in one hemisphere.

— Prof. Dr. Paulsen of the University of Berlin, Germany, in a letter in regard to the Berlitz schools of languages, says, "The method of Mr. Berlitz appears to me, as far as I have had the opportunity of familiarizing myself with it by some lessons and the expedients applied, a process specially suited to lead the pupil rapidly, safely, and with comparatively little trouble to himself, —

'*tuto, cito, jucunde*,' in the words of old Comenius, — to the practical mastery of the modern languages. Its peculiarity consists essentially in introducing the foreign tongue as a living tongue, drilling it from the very beginning by ear and speech instead of teaching it by reading and writing, like a deaf-mute language. During the instruction the pupil hears and speaks only the language he is to learn. The effect of this is, first, that he is enabled to follow, without difficulty, even rapid conversation in the foreign tongue; and, second, that he thoroughly acquires the pronunciation as well as the various expressions used in forming an assertion, question, or command. Whether the method can be employed in the instruction of large public-school classes, I am not yet able to state. It appears to me, however, beyond doubt, that the method is specially adapted to advance rapidly adults who desire to study a modern language for practical application. But I am also inclined to believe, that its use, at least supplementary to the ordinary public-school course, is practicable even in large classes, provided the teacher himself can converse in the language to be taught. It would be apt, above all, to re-awaken the pupil's interest, so easily blunted by grammatical exercises and translations. Really the method is only the systematized form of learning a foreign language in a foreign country by its actual use."

#### LETTERS TO THE EDITOR.

##### "Take Heed!"

MAY I be allowed to draw attention to an expression that is now creeping into our text-books and journals? Every teacher of chemistry is aware that students, when endeavoring to describe experiments, prefix to almost every sentence the word 'take.' "*Take a glass cylinder*," replies the student, when asked to describe the method by which hydrogen is collected, "fill it with water, and invert it in a vessel filled with water. Then *take a glass tube* and put the end of it under the mouth of the cylinder. Then, when the cylinder is full, *take a glass plate* and put it on the end of the cylinder, and *take it out of the water*," etc.

The careful teacher would interrupt this laborious and involved description at the start by suggesting the more concise statement, "Invert a jar filled with water," etc. Indeed, it is quite remarkable how students, when drilled by good teachers, soon fall into the way of expressing their ideas concisely and accurately; but it is discouraging, in reading articles written by men of high standing, to find directions beginning, "Take a jar," "Take a tube." Time is short, life is short, and our sciences are getting to be endless. Let us therefore discourage all verbosity and inaccuracy, and encourage simplicity and terseness of expression. Let the teacher, when the student begins his ramble by saying, "Well, you take salt, manganese di-oxide, and strong sulphuric acid to which some water has been added," stop him gently but firmly with "I will *not*! I am willing to teach chemistry for a small salary, and to sacrifice myself in the interest of science, but I must draw the line somewhere, and I draw it here. I will *not* take salt, manganese di-oxide, and strong sulphuric acid to which some water has been added."

Let every one be on his guard against the ravages of this word.

PETER T. AUSTEN.

New Brunswick, N.J., Oct. 15.

#### Ants transplanting the Scale-Bug.

IN bringing in from outside the window the other day some pots of agave infested with scale-bug, I placed one of these near a box of plants. Next day I noticed some red ants engaged at something on the point of one of the leaves. On examining more closely, I found three ants bringing scale-bugs from off a dying leaf of an agave to the leaf of a plant which it barely touched. They incited the slow bugs to move along by touching them with their antennæ, and in the course of half a day they had transplanted several of the half-grown insects. I am pretty sure, from the circumstances, that they were doing this, and I hardly think the scale could have crossed alone, from the position of the leaves. I question if the scale gives up its honey by excitation, like the aphids. I am inclined to believe that they deposit the drops of beautifully clear, viscid honey at night. The ants do associate with the scale for the pur-

pose of gathering this product, and have nests at the base of each plant suffering from scale.

The ants have been in my office for more than four years, and I have come to the conclusion, that, in my fight with the scale, they aid and abet the enemy.

There is one circumstance that reconciles me to the ants: they search out and destroy the larvæ of museum pests. A deer-skin coat infested with moth was thrown on the floor one day, and after a little while I noticed some ants crossing and burrowing in the hair in the most excited manner, and I also noticed some ants carrying away and devouring the plump, white moth-larvæ they had secured. I have seen them carrying the struggling 'millers' also.

WALTER HOUGH.

U. S. National Museum, Oct. 16.

#### Chest-Development.

I AM glad to say the practical experience of another year has completely confirmed the research I laid before the British Association at Birmingham and Manchester. The best type of chest has been easily obtained in young people; but anthropologists will, no doubt, be surprised to learn that a change in the same direction can with care be made in those of mature age. This I have seen in the diseased chest of a gentleman aged thirty-seven. Between the ages of twenty-five and thirty-three, similar results have been frequently noted. Here are facts that prove the direct power of the surroundings in making the different types of chest we meet with, and consequently we can now avoid those types that are known to be so injurious to the race by substituting for them that which we find at birth. No doubt, the proportion between the height and chest-girth that obtains at birth is a very high one; so much so, in fact, that it has been thought that I was acting unadvisedly in selecting it as the standard we ought to seek to attain. But it exists; and Mr. Brént's maximum chest-girth, obtained from a large number of actual measurements over forty years ago, closely agrees with it.

The method of treatment advocated in the paper on consumption has been successfully applied in six cases. One, whose chest-girth has increased about five inches, and whose vital capacity exceeds Hutchinson's so-called standard of health by seventy cubic inches, has passed medical examination for life-assurance; a second, whose chest-girth has increased nearly three inches, has been examined by a physician, who detected no signs of the previous disease; a third, whose vital capacity was eighty-five cubic inches, and now is two hundred and twenty cubic inches, has borne children, and continues well; and most satisfactory progress has been made in the others. To these we must add Sydenham's cures and the numerous recoveries by nature which were obtained by similar conditions. Hence the practical application of this method has completely confirmed the explanation I gave of the nature of the disease; and I have no doubt whatever that science has gained another victory in the conquest of a great enemy of civilized man.

G. W. HAMBLETON.

Dorchester Place, Blandford Square, London, Oct. 11.

#### Queries.

37. WHAT NUMBERS DOES IT TAKE TO MAKE A BILLION? — During colonial times, both in England and the Colonies, it took one million of millions to make a billion. During the first half of the present century, I think it may be affirmed that this notation had not been changed, and would have been held binding in law in the United States. It is certainly the most convenient for the astronomer, who has to deal with such enormous distances. The nearest of the twelve or fourteen fixed stars whose distances are approximately known to us require twenty, thirty, or forty English billions of miles to measure the space between the earth and them. The compilers of our modern American arithmetics, without any legislation on the subject, seem to have disregarded the old notation, and to have adopted the French method, of calling in numbers a thousand millions a billion. It is true that the French metric system has been legalized, but it does not make a kilometre an English mile.

E. T. MERRICK.

New Orleans, La., Oct. 13.